

**MACHINE-ASSISTED TRANSLATION (MAT):**

(19)[ISSUING COUNTRY]  
[JAPAN PATENT OFFICE (JP)] (JP)

**BEST AVAILABLE COPY**

(12)[GAZETTE CATEGORY]  
[PATENT GAZETTE] (A)

(11)[KOKAI NUMBER] Unexamined Japanese Patent Showa 60-108176

(51)[IPC INT. CL. 4] B23K 9/06

[INTERNAL CONTROL NUMBER] 6577-4E

(43)[DATE OF FIRST PUBLICATION] June 13, Showa 60

[REQUEST FOR EXAMINATION] No

[NUMBER OF INVENTIONS] 1

[NUMBER OF PAGES] 4

(54)[TITLE OF THE INVENTION] The arc starting method in consumable-electrode type arc welding processes

(21)[APPLICATION NUMBER] Application for patent Showa 58-218532

(22)[DATE OF FILING] November 18, Showa 58 (1983. 11.18)

(72)[INVENTOR]  
[NAME OR APPELLATION] Kunio Uchikoshi

[ADDRESS OR DOMICILE]  
(72)[INVENTOR]  
[NAME OR APPELLATION] Ikuyori Kazuyuki

[ADDRESS OR DOMICILE]  
(71)[PATENTEE/ASSIGNEE]  
[NAME OR APPELLATION] Osaka electricity incorporated company

[ADDRESS OR DOMICILE]  
(74)[AGENT]  
[PATENT ATTORNEY]  
[NAME OR APPELLATION] Koichi Suzue et al.

[SPECIFICATION]

**[TITLE OF THE INVENTION]** The arc starting method in consumable-electrode type arc welding processes

**[CLAIMS]**

The arc starting method in consumable-electrode type arc welding processes performed using shielding gas in which, at first, it is without the constant current characteristic of small electric current, or drooping characteristic about the output characteristics of welding source, and if electrode wire short-circuits with base material too hastily, supply of electrode wire will be stopped immediately, predetermined time preheating of this electrode wire is carried out by short circuit current which flows into base material through this electrode wire, and while switching the output characteristics of welding source to constant voltage characteristic immediately after this predetermined time passage more and forcedly lighting arc, supply of electrode wire is started.

**[DETAILED DESCRIPTION OF THE INVENTION]**

**[TECHNICAL FIELD]** This invention is improvement of the arc starting method in consumable-electrode type arc welding processes, and relates to the arc starting method which can perform reliable starting in particular.

**[PRIOR ART]**

In automatic and semi automatic arc welding, in order to perform smooth and efficient operation, to perform good arc starting is made into indispensable condition.

For this reason, although various development proposal of the method of performing arc starting better than conventionally is made, in order to make restart of arc good, for example, at the time of the last welding completion, voltage given to electrode wire is reduced and arc length is shortened, what the form of various a welding end at front end tends to be changed at the time of short circuit with base material of electrode wire, and it is going to start is already well-known.

However, generally, what depends on such a method is difficult to control, and in order to use it for the automatic-arc-welding method which does not necessarily restrict as arc occurrence can be performed reliably, but is performed in particular using robot, it is unsuitable.

Moreover, it is disclosed by Unexamined-Japanese-Patent No. 56-6784,56-9002, although method of preventing occurrence of spatter or burn back through small electric current using starting power source with constant current characteristic or drooping characteristic of small electric current to electrode wire before arc occurrence, switching after arc occurrence to welding source of constant voltage characteristic, and making it fixed welding current flow is also proposed, since each of these methods retreats electrode wire slightly and method of generating arc is used for them, after electrode wire short-circuits with base material too hastily, control of electrode wire, especially control which retreats wire are especially troublesome and complicated.

**[SUMMARY OF THE INVENTION]** This invention provides the arc starting

method developed in order to solve this problem, and it is cheap and it aims at providing the easy arc starting method of implementation that reliable arc starting is possible and occurrence and burn-back phenomenon of spatter at the time of arc starting can be prevented effectively.

That is, this invention is the arc starting method in consumable-electrode type arc welding processes performed using shielding gas in order to attain above objective, and is beginning, it is without the constant current characteristic of small electric current, or drooping characteristic about the output characteristics of welding source.

If electrode wire short-circuits with base material too hastily, supply of electrode wire will be stopped immediately, predetermined time preheating of this electrode wire is carried out by short circuit current which flows into base material through this electrode wire, and while switching the output characteristics of welding source to constant voltage characteristic immediately after this preheating-time passage and forcedly lighting arc, it makes to start supply of electrode wire into summary.

#### Disclosure of Example

Hereafter, method of this invention is illustrated.

Apparatus for implementing method of this invention is shown in FIG. 1.

As for 1, in this figure, starting power source and 6 are welding tips welding source and 2.

Both these power sources 1 and 2 have resistor 12 which carries out preset control of DC reactor 11 for each aiming at stability of arc, and the output current of starting power source 2, and are mutually connected to juxtaposing between electrode wire 7 and base material 9-ed, welding source 1 has the so-called output characteristics of constant voltage, and the output characteristics of starting power source 2 have constant current characteristic or drooping characteristic of small electric current.

Moreover, 3 is a voltage detector which detects voltage between electrode wires 7 and base materials 9 equipped with timer, when it connects with juxtaposing mutually to said welding source 1 and said starting power source 2 and electrode wire 7 and base material 9 short-circuit too hastily, this apparatus 3 detects that state, sends signal required for control to two said power sources, and starts count of timer (not shown) with which inside was equipped simultaneously.

That is, at this Example, they are input of said welding sources 1 and 2, and interruption by this apparatus 3, if it is constructed so that command may be given to wire supply controlled source 4 and target control may be made, and detector 3 detects short circuit of electrode wire 7 and base material 9, stop signal is sent to wire supply controlled source 4, action of supply roll 8 is stopped, supply of electrode wire 7 is stopped, internal timer is acted simultaneously, and count of preheating time is started.

Then, if predetermined time comes, welding source 1 will be switched on immediately, starting power source 2 will be interrupted, and effect which sends action signal to wire supply controlled source 4 simultaneously, starts action of supply roll 9, and restarts supply of electrode wire 7 is made.

Next, method of this invention is illustrated using apparatus which makes such composition.

Starting signal is sent and wire supply controlled source 4 is switched on, although supply motor 5 is rotated and supply of wire 7 is performed, supply of wire 7 in this case adopts the so-called slowdown performed by making rotation of supply motor 5 into low speed (shown by "a" in Fig. 2).

In this way, if it supplies welding wire 7, shielding gas will flow out simultaneously and wire 7 will short-circuit with base material 9 too hastily.

Then, voltage between wire 7 and base material 9 is set to about 0 V.

Therefore, detector 31 detects this, stop signal is immediately sent to controlled source 4, and rotation of supply roll 8 is stopped.

As a result, although stopped by wire 7 in the state of having made base material 7 shorten that front end, since welding source 1 is not switched on but only starting power source 2 is switched on between electrode wire 7 and base material 9, in this phase, only small electric current  $I_t$  (100-150A) set up by starting power source 2 flows into wire 7.

For this reason, wire 7 is cut within instant and produces neither harmful spatter nor burn-back phenomenon.

In this way, after wire 7 short-circuits with base material 9 too hastily, timer in detector 3 acts and count of preheating time is started.

Then, preheating time set up beforehand, for example, although it changes with diameters of electrode wire etc., if  $T_1$  (0.1 to 1.0 sec) elapses, detector 3 interrupts switched-on starting power source 2, supplies welding-source ?, sends action signal to wire supply controlled source 4 still more nearly simultaneously with switch of this power source, and re-closes supply of wire 7.

Then, although great electric current " $I_s$ " required at the time of arc welding is received in electrode wire 7 from welding source 1, it moves to arc welding smoothly, without cutting from the origin within instant, and generating harmful spatter or electrode wire 7 producing burn-back phenomenon, since it already pre-heats electrode wire 7 sufficiently at this point.

In particular, according to method of this invention, nearly-middle part of the front end and tip base end will be cut, and welding wire 7 forcedly lights arc 10.

In this way, if arc 10 is lit, since voltage between wire 7 and base material 9 rises from 0V at the time of short circuit to appropriate arc voltage (10-30V), it will send action signal to wire supply controlled source 4, will rotate supply roll 8 at regular speed ("b" shown in Fig. 2), will restart supply of wire 7, will interrupt starting power source 2 simultaneously, and will switch on welding source 1.

If welding source 1 is switched on and supply of wire 7 is restarted in this way, between wire 7 and base material 9, it will be maintained at constant voltage required in order to maintain arc 10 stably, and arc welding will be performed.

FIG. 2 is timing chart shown in order to make easy understanding of operation of method of this invention.

Furthermore, in Example as stated above, although short circuit of wire 7 and base material 9 is performed by detecting voltage between both, even if it makes it composition which detects electric-current value which flows among both, this invention can be implemented.

Moreover, something of another composition is used for welding source 1 and

starting power source 2 in the Example as stated above.

However, it cannot be overemphasized that after arc occurrence is switched to constant voltage characteristic which corresponds to curve AB of FIG. 3, and it may make it generate welding arc without drooping characteristic with which method of this invention may be implemented using single power source, and the output characteristics of the power source are corresponded to curve CD of FIG. 3 at the time of arc starting in such a case.

**[ADVANTAGE OF THE INVENTION]** According to method of this invention, it is at the arc starting time so that it may be understood also from the above explanation, since predetermined time stop is carried out while wire was moved forward and contacted to base material and base material had been made to contact wire, small electric current is passed, predetermined time preheating is carried out, welding source is switched to constant voltage characteristic and electrode wire is made to forcedly generate arc, since heavy current flows into wire and wire is not heated rapidly, neither spatter nor burn-back phenomenon is produced, and always good and reliable arc starting can be obtained.

Moreover, since wire is not retreated one-by-one from base material at the time of arc occurrence, it is easy made, and for this reason, composition of apparatus is also easy to control, and they has advantage, like it can cheaply do.

Furthermore, occurrence of arc has very high practical value, in order to be able to perform starting of arc quickly since power source is switched to constant voltage characteristic and is forcedly generated, immediately after heating electrode wire sufficiently with starting power source, and for there to be remarkably improvable advantage and to adopt operation efficiency as the arc starting method.

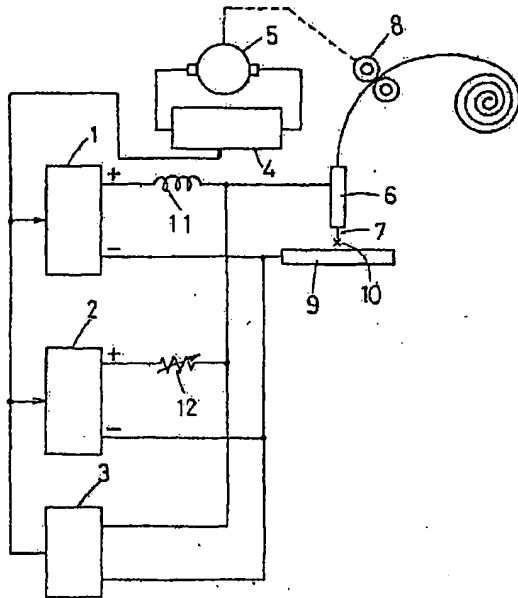
**[Brief Description of Drawings]** FIG. 1 is outline block diagram showing one Example of apparatus for implementing this invention, FIG. 2 is a timing chart which shows operating state of each part of FIG. 1 explaining method of this invention, FIG. 3 shows output-characteristics figure of welding source used in method of this invention.

**[DESCRIPTION OF SYMBOLS]** In the figure, 1 is welding source, 2 is starting power source, 3 is detector, 4 is controlled source, 5 is supply motor, g is welding tip, 7 is electrode wire, 8 is supply roll, 9 is welding base material, 10 is arc.

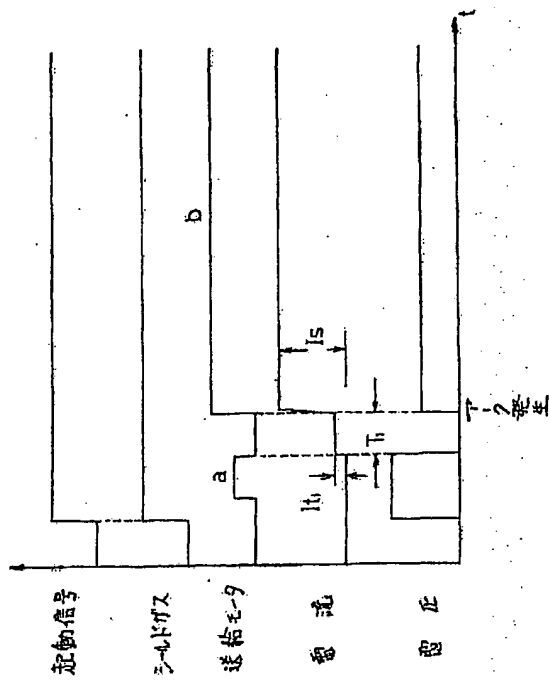
**[PATENTEE/ASSIGNEE]** Osaka electricity incorporated company

**[AGENT]** Patent attorney Koichi Suzue

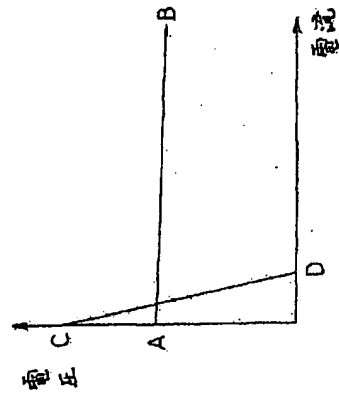
第 1 図



第 2 図



第 3 図





## DERWENT TERMS AND CONDITIONS

*Derwent shall not in any circumstances be liable or responsible for the completeness or accuracy of any Derwent translation and will not be liable for any direct, indirect, consequential or economic loss or loss of profit resulting directly or indirectly from the use of any translation by any customer.*

Derwent Information Ltd. is part of The Thomson Corporation

Please visit our home page:

["WWW.DERWENT.CO.UK"](http://WWW.DERWENT.CO.UK) (English)

["WWW.DERWENT.CO.JP"](http://WWW.DERWENT.CO.JP) (Japanese)

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER: \_\_\_\_\_**

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**